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MEMORANDUM

DATE 14 January 1999

TO: David Bennett, WAM, U S. EPA, Region X

FROM: Michelle Turner, Chemist, WESTON, Seattle
RENN, Roger McGinnis, Senior Environmental Chemist, WESTON, Seattle

SUBJECT: Validation of Inorganics Data
Laboratory Batch K9805842
Site: Duwamish River

WORK ASSIGNMENT NO : 46-23-0JZZ

WORK ORDER NO.: 4000-019-038-5200-00

DOC CONTROL NO : 4000-019-038-AAAK

cc: Bruce Woods, RAP-WAM, U.S. EPA, Region X
Dena Hughes, Site Manager, WESTON, Seattle (memo only)
Kevin Mundell-Jackson, Database Management, WESTON, Seattle

The quality assurance review of twenty sediment samples, laboratory batch K9805842, collected from the Duwamish River has been completed. The sediment samples were analyzed for inorganics by Columbia Analytical Services of Kelso, Washington using EPA Methods 200, 6010, 6020, and 7000 series as required to achieve detection limit goals. The samples were numbered.

98354060	98354061	98354062	98354063	98354064
98354065	98354066	98354067	98354068	98354069
98354070	98354071	98354072	98354073	98354074
98354082	98354083	98354084	98354085	98354086

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QA Review Batch K9805842 (Inorganics/Metals)

Site: Duwamish River

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Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract. The review follows the format described in the U.S. EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA OSWER 9240.1-05-01, February 1994) modified to include specific requirements of the analytical methods.

1. Holding Times

Holding times of 28 days for mercury and six months for other metals (from date of collection to analysis) were established in the project Sampling and Analysis Plan. All samples met holding time criteria.

2 Calibration

a) Initial Calibration

Initial calibration frequencies and QC criteria were met for ICP and ICP/MS analyses.

Mass calibration for all ICP/MS internal standards was within 0.1 atomic mass unit of the true mass. ICP/MS resolution was less than 0.9 amu full width at 10 percent peak height.

b) CRI/CRA Standards

Instrument calibration was verified using low level standards near the project required detection limit.

c) Initial and Continuing Calibration Verification

All inductively coupled plasma (ICP) and ICP/MS results met control limits of 90 to 110 percent recovery (percent R) of the true values for both initial and continuing calibration.

Mercury cold vapor AA (CVAA) results met control limits of 80 to 120 percent recovery (percent R) for both initial and continuing calibration.

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QA Review Batch K9805842 (Inorganics/Metals)

Site Duwamish River

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3. Instrument Detection Limits

All instrument detection limits (IDL) for ICP, ICP/MS, and mercury analyses met project requirements specified in the project Sampling and Analysis Plan.

4. Blanks

a) Laboratory Method Blanks

The following analytes were detected in laboratory method blanks.

Blank ID	Analyte	Concentration	Associated Samples
K9805842-MB	Cadmium	0.02 mg/Kg	98354060 through 98354074 98354082 through 98354086
K9805842-MB	Magnesium	3 mg/Kg	98354060 through 98354074 98354082 through 98354086
K9805842-MB	Tin	2 mg/Kg	98354060 through 98354074 98354082 through 98354086

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank

b) Initial Calibration and Continuing Calibration Blanks

The following elements were found in calibration blanks.

Blank ID	Analyte	Concentration	Associated Samples
CCB1	Arsenic	-0.1 µg/L	98354085
CCB1	Cadmium	0.09 µg/L	98354085

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QA Review Batch K9805842 (Inorganics/Metals)

Site Duwamish River

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Blank ID	Analyte	Concentration	Associated Samples
CCB2	Arsenic	-0.1 µg/L	98354060 through 98354064 98354082 through 98354084 98354086
CCB2	Cadmium	0.05 µg/L	98354060 through 98354064 98354082 through 98354084 98354086
CCB2	Selenium	0.3 µg/L	98354060 through 98354064 98354082 through 98354084 98354086
CCB2	Thallium	0.01 µg/L	98354060 through 98354064 98354082 through 98354084 98354086
CCB3	Cadmium	0.07 µg/L	98354065 through 98354074
CCB3	Thallium	0.01 µg/L	98354065 through 98354074
CCB4	Cadmium	0.05 µg/L	none
CCB4	Selenium	0.4 µg/L	none

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank.

c) Field Blanks

No field blank samples were associated with this laboratory batch

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5. ICP and ICP/MS Interference Check

All analytes for the interference check samples were within the control limits of 80 to 120 percent of the true values. Internal standard intensities for analytes determined by ICP/MS were within \pm 20 percent of the initial calibration intensity.

6. Laboratory Control Sample

Laboratory control sample recoveries were within the QC limits for all analytes.

7. Laboratory Duplicate Sample Analysis

Relative percent difference (RPD) between laboratory duplicate results were less than the QC limits of 35 percent (or \pm 2 times the quantitation limit for concentrations < 5 times the quantitation limit) for all analytes

8. Spiked Sample Analysis

The matrix spike recoveries for the following analytes were outside QC limits:

Sample	Analyte	% Recovery	QC Limits
98354085	Antimony	55	75-125

In addition, as the native sample concentrations for Aluminum and Iron exceeded the spike concentration by more than 4 times, recoveries were not calculated. Data were not qualified solely on matrix spike results.

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QA Review Batch K9805842 (Inorganics/Metals)

Site. Duwamish River

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9. ICP and ICP/MS Serial Dilution

Serial dilutions were not routinely performed for this SDG.

10. ICP/MS Quality Control

a) Duplicate Analysis

Duplicate analyses were not performed for this SDG.

b) Post Digest Spike Recovery

Post digest spikes were not performed for this SDG.

c) Method of Standard Additions

No samples required MSA analysis.

d) ICP/MS Internal Standards

The intensity of all internal standards was within limits of 30 to 120 percent of the initial calibration intensity for all samples.

10. Field Duplicate Analysis

No field duplicates were associated with this SDG.

11. Sample Analysis

A cursory raw data review was performed. All laboratory deliverables were present and complete. The case narrative indicated that the MS recovery of Antimony for sample 98354085 was outside the QC limits due to suspected matrix interference. As the LCS recovery was within QC limits, no further action was taken. The MS recovery of Aluminum and Iron in this sample was not calculated due to high analyte concentrations in the sample. No other problems were noted.

12. Laboratory Contact

No laboratory contact was required.

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Site: Duwamish River

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Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

Data Qualifiers

U - The material was analyzed for, but was not detected.

UJ - The analyte was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.

J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported were less than the CRDL or lowest calibration standard

R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/26/98
Date Received: 8/27/98

Total Metals

Sample Name	98354060	Units	mg/Kg (ppm)						
Lab Code	K9805842-001	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	23000	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	12 7	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	73	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 42	
Cadmum	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 4	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6380	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	27	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	44	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	32600	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	21 5	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	8270	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	365	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 21	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	20 1	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2700	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	13 4	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 19	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	15500	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 12	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4	JU
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	70	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	97	

Approved By

IS44mc/031695

05842ICP EMI Sample 10/8/98

Date

10/6/98

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KGT/JL/KF

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/26/98
Date Received: 8/27/98

Total Metals

Sample Name	98354061	Units	mg/Kg (ppm)
Lab Code	K9805842-002	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	21100	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	11 6	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	69	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 38	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 2	<i>✓ km</i>
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6040	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	26	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	35	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	28400	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	15 6	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7510	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	279	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 15	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	20 9	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2400	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	12 7	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 15	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	10700	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 10	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	3 <i>JU</i>	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	64	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	78	

Approved By _____

1S44Inc/031695

05842ICP EM1 Sample (2) 10/8/98

JL

Date *10/8/98*

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10/8/98

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/26/98
Date Received: 8/27/98

Total Metals

Sample Name	98354062	Units	mg/Kg (ppm)
Lab Code	K9805842-003	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	25600	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	11 6	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	79	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 44	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 4	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6840	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	29	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	44	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	32900	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	22 6	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	8650	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	334	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 12	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	20 8	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	3000	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	15	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 20	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	14600	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 12	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4 J	4 J
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	73	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	98	

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Approved By

IS44Inc/031695

05842ICP EM1 Sample (Y) 10/8/98

Date

10/1/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/26/98
Date Received: 8/27/98

Total Metals

Sample Name	98354063	Units	mg/Kg (ppm)
Lab Code	K9805842-004	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	21000	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	10 0	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	69	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 40	
Cadmum	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 3	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	5980	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	27	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	39	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	28800	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	18 5	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7650	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	299	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 13	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	22 0	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2460	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	14	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 16	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	11200	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 11	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4	J
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	65	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	85	

kg/lb/ft

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1S44mc/031695

05842ICP EM1 Sample (4) 10/8/98

JC

Date 10/8/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354082	Units	mg/Kg (ppm)						
Lab Code	K9805842-005	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	26500	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	14 0	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	91	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 46	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 5	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	7310	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	37	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	11	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	75	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	34900	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	46 6	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9170	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	354	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 19	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	24 7	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	3190	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	15	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 38	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	14000	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 16	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	8	JW
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	77	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	136	

WAT/10/98

Approved By

IS44mc/031695

05842ICP EM1 Sample (5) 11/6/98

Date 11/6/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354083	Units	mg/Kg (ppm)
Lab Code	K9805842-006	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	26900	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	11 2	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	98	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 49	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 4	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6820	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	34	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	12	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	53	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	33500	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	25 5	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9210	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	393	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 17	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	28 0	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	3040	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	17	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 29	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	12100	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 15	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	5 JU	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	77	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	99	

Not Interfering

Approved By (Signature)
 IS44mc/031695
 05842ICP EMI Sample (6) 11/6/98

Date 11/6/98

00012

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354084	Units	mg/Kg (ppm)
Lab Code	K9805842-007	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	21300	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/22/98	10/7/98	11.6	
Barium	EPA 3050B	6010B	1	0.6	2	9/15/98	10/7/98	82	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/22/98	10/7/98	0.42	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/22/98	10/7/98	0.4	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6880	
Chromium	EPA 3050B	6010B	2	0.7	2	9/15/98	10/7/98	27	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	55	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	29000	
Lead	EPA 3050B	200 8	0.02	0.004	10	9/22/98	10/7/98	32.5	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7660	
Manganese	EPA 3050B	6010B	1	0.4	2	9/15/98	10/7/98	332	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.13	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/22/98	10/7/98	22.9	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2540	
Selenium	EPA 3050B	200 8	1	0.3	10	9/22/98	10/7/98	15	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/22/98	10/7/98	0.26	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	11100	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/22/98	10/7/98	0.14	
Tin	EPA 3050B	200 8	2	0.05	10	9/22/98	10/7/98	5 J 4	
Vanadium	EPA 3050B	6010B	2	0.6	2	9/15/98	10/7/98	65	
Zinc	EPA 3050B	6010B	2	0.8	2	9/15/98	10/7/98	102	

WOF/10/98

Approved By

1S44mc/031695

05842ICP EMI - Sample (7) 11/6/98

Date 11/6/98

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Page No

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354085	Units	mg/Kg (ppm)
Lab Code	K9805842-008	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	9410	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/22/98	10/7/98	60	
Barium	EPA 3050B	6010B	1	0.6	2	9/15/98	10/7/98	41	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/22/98	10/7/98	0.20	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/22/98	10/7/98	0.2	<i>Z ppm</i>
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	3600	
Chromium	EPA 3050B	6010B	2	0.7	2	9/15/98	10/7/98	15	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	5	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	26	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	15000	
Lead	EPA 3050B	200 8	0.02	0.004	10	9/22/98	10/7/98	15.7	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	3540	
Manganese	EPA 3050B	6010B	1	0.4	2	9/15/98	10/7/98	140	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.07	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/22/98	10/7/98	13.6	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1100	
Selenium	EPA 3050B	200 8	1	0.3	10	9/22/98	10/7/98	7	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/22/98	10/7/98	0.14	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	5370	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/22/98	10/7/98	0.08	
Tin	EPA 3050B	200 8	2	0.05	10	9/22/98	10/7/98	4	<i>JU</i>
Vanadium	EPA 3050B	6010B	2	0.6	2	9/15/98	10/7/98	43	
Zinc	EPA 3050B	6010B	2	0.8	2	9/15/98	10/7/98	54	

K9805842

Approved By d
 1544inc/031695
 058421CP EM1 Sample (8) 11/6/98

Date 11/6/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
 Project: Duwamish River/4000-027-001-2019-38
 Sample Matrix: Sediment

Service Request: K9805842
 Date Collected: 8/27/98
 Date Received: 8/28/98

Total Metals

Sample Name	98354086	Units	mg/Kg (ppm)
Lab Code	K9805842-009	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	26000	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	13 0	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	88	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 45	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 5	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	7880	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	34	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	11	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	73	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	33600	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	38 1	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9180	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	354	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 25	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	25 5	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	3140	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	16	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 37	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	13400	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 14	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	10	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	75	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	121	

WAT/10/98

Approved By
 1S44mc/031695
 05842ICP EM1 Sample (9) 11/6/98

Date 11/6/98

00015

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354064	Units	mg/Kg (ppm)						
Lab Code	K9805842-010	Basis	Dry						
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	14400	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	10 7	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	40	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 29	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 2	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	4610	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	20	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	43	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	28600	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	26 7	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	5970	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	303	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 08	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	16 9	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1720	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	12	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 13	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	9960	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 07	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4	J4
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	52	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	72	

10/7/1998

Approved By 
IS44Inc/031695
05842ICP EM1 - Sample (10) 11/6/98

Date 11/6/98

00016

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354065	Units	mg/Kg (ppm)
Lab Code	K9805842-011	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	15000	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	7 4	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	43	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 27	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 3	7
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6180	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	21	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	34	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	21500	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	25 4	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	5530	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	205	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 32	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	16 3	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1780	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	11	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 20	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	7980	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 09	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4	JG
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	55	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	78	

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Approved By H
 IS44mc/031695
 05842ICP EM1 - Sample (11) 11/6/98

Date 11/6/98

00017

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354066	Units	mg/Kg (ppm)
Lab Code	K9805842-012	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	12700	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	6 5	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	33	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 25	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 2	<i>J Rm</i>
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	4440	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	17	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	6	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	37	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	18200	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	22 0	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	4650	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	253	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 06	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	13 9	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1500	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	10	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 11	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	7550	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 05	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4	<i>J 4</i>
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	48	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	63	

10/7/98

Approved By R
IS44Inc/031695
05842ICP EM1 - Sample (12) 11/6/98

Date 11/6/98

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354067	Units	mg/Kg (ppm)						
Lab Code	K9805842-013	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	19500	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	8 9	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	55	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 37	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 2	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	5720	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	25	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	33	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	26700	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	16 1	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7000	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	259	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 09	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	20 3	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2100	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	14	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 18	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	8500	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 08	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	3 <i>JU</i>	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	60	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	79	

VAT/lot#9

Approved By *R*
 1S44mc/031695
 05842ICP EMI - Sample (13) 11/6/98

Date 11/6/98

00019

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354068	Units	mg/Kg (ppm)						
Lab Code	K9805842-014	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	17200	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	8 8	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	52	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 34	
Cadmum	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 2	<i>✓</i>
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	5310	<i>✓</i>
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	22	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	9	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	31	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	23500	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	15 4	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	6470	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	327	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 09	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	19 5	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1800	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	13	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 13	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	8630	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 08	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4 <i>J4</i>	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	55	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	73	

WT/10/98

Approved By *(Signature)*
 IS44inc/031695
 05842ICP EM1 - Sample (14) 11/6/98

Date *11/6/98*

00020

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354069							Units	mg/Kg (ppm)
Lab Code	K9805842-015							Basis	Dry
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	12100	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	8 4	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	32	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 22	
Cadmum	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 3	J
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	4300	rem
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	19	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	28	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	19600	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	21 6	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	4510	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	340	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 07	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	14 3	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1280	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	10	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 14	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	5900	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 06	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4	J
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	50	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	68	

10/1/98

Approved By

1S44mc/031695

05842ICP EM1 - Sample (15) 11/6/98

Date 11/6/98

00021

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354070						Units	mg/Kg (ppm)	
Lab Code	K9805842-016						Basis	Dry	
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	12200	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	48 1	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	42	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 25	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	1 4	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	14700	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	64	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	8	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	56	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	32900	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	181	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	5940	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	558	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 09	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	31 8	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1180	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	12	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	1 28	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	6770	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 07	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	7	JU
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	59	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	233	

10/11/98

Approved By 
1S44mc/031695
05842ICP EM1 - Sample (16) 11/6/98

Date 11/6/98

00022

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354071	Units	mg/Kg (ppm)
Lab Code	K9805842-017	Basis	Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	22400	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	9 8	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	72	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 39	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 2	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	3020	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	14	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	6	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	26	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	23900	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	12 7	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	5780	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	533	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 04	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	9 1	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	11100	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	13	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 29	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	13000	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 04	J
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	3	JU
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	39	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	66	

11/6/98

Approved By 
 LS44mc/031695
 05842ICP EM1 Sample (17) 11/6/98

Date 11/6/98

00023
 Page No

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment **Service Request:** K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354072	Units	mg/Kg (ppm)						
Lab Code	K9805842-018	Basis	Dry						
Test Notes									
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	17900	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	24 9	
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	69	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 34	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	1 0	
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	5570	
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	180	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	10	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	157	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	32000	
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	152	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	6780	
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	721	
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 19	
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	96 4	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	1900	
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	15	
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 43	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	8520	
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 11	
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	9 <i>JU</i>	
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	66	
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	240	

10/1/98

Approved By *(Signature)*
 IS44Inc/031695
 05842ICP EM1 Sample (18) 11/6/98

Date *11/6/98*

00034

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354073						Units	mg/Kg (ppm)
Lab Code	K9805842-019						Basis	Dry
Test Notes								
Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	22300
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND
Arsenic	EPA 3050B	200 8	0 5	0 1	10	9/22/98	10/7/98	9 5
Barium	EPA 3050B	6010B	1	0 6	2	9/15/98	10/7/98	64
Beryllium	EPA 3050B	200 8	0 02	0 02	10	9/22/98	10/7/98	0 40
Cadmium	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	0 4
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	6160
Chromium	EPA 3050B	6010B	2	0 7	2	9/15/98	10/7/98	31
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	10
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	44
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	28800
Lead	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	26 2
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	8250
Manganese	EPA 3050B	6010B	1	0 4	2	9/15/98	10/7/98	293
Mercury	7471A	7471A	0 05	0 02	1	9/14/98	9/16/98	0 13
Nickel	EPA 3050B	200 8	0 2	0 02	10	9/22/98	10/7/98	24 5
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2680
Selenium	EPA 3050B	200 8	1	0 3	10	9/22/98	10/7/98	15 9
Silver	EPA 3050B	200 8	0 02	0 004	10	9/22/98	10/7/98	0 21
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	12000
Thallium	EPA 3050B	200 8	0 02	0 006	10	9/22/98	10/7/98	0 12
Tin	EPA 3050B	200 8	2	0 05	10	9/22/98	10/7/98	4 J U
Vanadium	EPA 3050B	6010B	2	0 6	2	9/15/98	10/7/98	67
Zinc	EPA 3050B	6010B	2	0 8	2	9/15/98	10/7/98	94

WT/100%

Approved By Date 11/6/98
 LS44Inc/031695
 05842ICP EM1 Sample (19) 11/6/98

00025

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9805842
Date Collected: 8/27/98
Date Received: 8/28/98

Total Metals

Sample Name	98354074	Units	mg/Kg (ppm)
Lab Code	K9805842-020	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	15500	
Antimony	EPA 3050B	6010B	10	5	2	9/15/98	10/7/98	ND	
Arsenic	EPA 3050B	200 8	0.5	0.1	10	9/22/98	10/7/98	9.6	
Barium	EPA 3050B	6010B	1	0.6	2	9/15/98	10/7/98	41	
Beryllium	EPA 3050B	200 8	0.02	0.02	10	9/22/98	10/7/98	0.28	
Cadmium	EPA 3050B	200 8	0.2	0.02	10	9/22/98	10/7/98	0.2	J
Calcium	EPA 3050B	6010B	10	3	2	9/15/98	10/7/98	4780	R
Chromium	EPA 3050B	6010B	2	0.7	2	9/15/98	10/7/98	22	
Cobalt	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	7	
Copper	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	32	
Iron	EPA 3050B	6010B	4	4	2	9/15/98	10/7/98	24000	
Lead	EPA 3050B	200 8	0.02	0.004	10	9/22/98	10/7/98	25.9	
Magnesium	EPA 3050B	6010B	2	2	2	9/15/98	10/7/98	5520	
Manganese	EPA 3050B	6010B	1	0.4	2	9/15/98	10/7/98	327	
Mercury	7471A	7471A	0.05	0.02	1	9/14/98	9/16/98	0.07	
Nickel	EPA 3050B	200 8	0.2	0.02	10	9/22/98	10/7/98	15.9	
Potassium	EPA 3050B	6010B	400	400	2	9/15/98	10/7/98	2480	
Selenium	EPA 3050B	200 8	1	0.3	10	9/22/98	10/7/98	12	
Silver	EPA 3050B	200 8	0.02	0.004	10	9/22/98	10/7/98	0.16	
Sodium	EPA 3050B	6010B	20	20	2	9/15/98	10/7/98	8060	
Thallium	EPA 3050B	200 8	0.02	0.006	10	9/22/98	10/7/98	0.06	
Tin	EPA 3050B	200 8	2	0.05	10	9/22/98	10/7/98	4	J
Vanadium	EPA 3050B	6010B	2	0.6	2	9/15/98	10/7/98	55	
Zinc	EPA 3050B	6010B	2	0.8	2	9/15/98	10/7/98	79	

11/6/98

Approved By _____ 

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05842ICP EM1 - Sample (20) 11/6/98

Date 11/6/98

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